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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,243	12/04/2003	Duck Young Jung	SUN-0035	7809
23413	7590	02/21/2008	EXAMINER	
CANTOR COLBURN, LLP			PETERSON, CHRISTOPHER K	
20 Church Street			ART UNIT	
22nd Floor			PAPER NUMBER	
Hartford, CT 06103			2622	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/728,243	<b>Applicant(s)</b> JUNG, DUCK YOUNG	
	<b>Examiner</b> Christopher K. Peterson	<b>Art Unit</b> 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2008.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,4-6 and 15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-6 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/03/2008 has been entered.

### ***Response to Amendment***

2. Examiner notes that claims 2, 7, 10 - 14, 17 - 19 are canceled per claims submitted on 1/3/2008. Applicant's Remarks cite that claim 2 is still pending (2<sup>nd</sup> Para page 5 of Remarks), but claims show it canceled (Amendments to claims, page 2). Therefore Examiner will not analyze claim 2. Claims 1, 4 - 6, and 15 are pending. Examiner withdraws claim objection to claims 4 and 6.

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 1, 4 - 6, and 15 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**5. Claim 1 and 4 - 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rotzoll (US Patent 6,806,458) in view of Bock (US Patent 6,707,410).**

As to claim 1, Rotzoll (Fig. 6A) teaches an image sensor (photo detector array 420 of Fig. 4) having a plurality of pixels, each pixel comprising:

- a photocell (photosensitive element 1000 and integrating circuit 1100) which receives light and generates an analog signal corresponding to a quantity of the received light (Col. 3, line 57 – Col. 4, line 5). Rotzoll shows the pixel in greater detail in figure 3. The photosensitive element (1000) and the integrating circuit (1100) (support hardware) provide an analog signal ( $V_{out}(t)$ ).
- a latch type comparator (comparator circuit 1300 A-D) which compares the analog signal of the photocell ( $V_{out}(t)$ ) and an analog signal of a photocell of an adjacent pixel ( $V_{r1}$  (pixel on the right) or  $V_{u1}$  (pixel on top)) and generates a digital signal having a value of the compared result ( $E_x$  and  $E_y$ ) (Col. 9, lines 28 – 42). In figure 7, Rotzoll shows the latch type comparator (1300) in greater detail. The timing signal ( $\Phi 2$ ) is used to latch the comparator (Col. 10, lines 46 – 50).
- where in the digital signal is a digital signal having a 1-bit structure. It is well known in the art that a comparator acts like an analog to digital

converter; therefore the output (Ex- and Ey-) would either be high or low giving two different outputs.

Rotzoll (Fig. 1) teaches the outputs of the comparators go through a NAND gate (1765, 1770, and 1775) and latch (1760 A-C) (Col. 3, lines 45 – 49). Rotzoll also teaches the NAND gates of figure 2 are not illustrated in figure 6A and B. Rotzoll does not specifically teach a switch. Rotzoll teaches the output may be directly supplies to the processing means (Col. 9, lines 49 – 58). The Bock reference is brought in to teach a switch on the output of the comparator. Bock (Fig. 3) teaches a latch type comparator with a switch (306) on the output of the comparator (Col. 3, lines 61 – 64). The comparator is used with additional circuitry to perform analog-to-digital conversion. Replacing the analog-to-digital converter and memory of a conventional digital pixel sensor minimizes many issues associated with conventional digital pixel sensors while preserving the architecture's resistance to noise and speed. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a switch as taught by Bock to the sensing device and optical pointing device of Rotzoll, because the digital pixel sensor (DPS) architecture preserves the superior noise, low power consumption, and speed characteristics associated with digital pixel systems (Col. 1, line 54 – Col. 2, line 8).

As to claim 4, Rotzoll wherein the analog signal ( $V_{out}(t)$ ) of the photocell (1000 and 1100) of the adjacent pixel ( $V_{r1}$  (pixel on the right) or  $V_{u1}$  (pixel on top)) is a reference voltage (Col. 9, lines 28 – 42).

As to claim 5, Rotzoll teaches wherein the photocell (1000 and 1100) is a photo diode (1000) that generates a photocurrent corresponding to the received quantity of light (Col. 8, lines 57 – 65).

As to claim 6, Rotzoll teaches wherein the latch type comparator (1300 A-D) outputs (Ex- and Ey-) a first signal when the analog signal (Vout (t)) of the photocell (1000 and 1100) is greater than the analog signal (Vr1 or Vu1) of the photocell (1000 and 1100) of the adjacent pixel (pixel on the right or pixel on top) and outputs a second signal when the analog signal (Vout (t)) of the photocell (1000 and 1100) is less than the analog signal (Vr1 or Vu1) of the photocell (1000 and 1100) of the adjacent pixel (pixel on the right or pixel on top) (Col. 9, lines 28 – 42). It is well known in the art that a comparator acts like an analog to digital converter; therefore the output (Ex- and Ey-) would either be high or low giving two different outputs.

**6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rotzoll (US Patent 6,806,458) in view of Bock (US Patent 6,707,410) further in view of Arias – Estrada (US Patent 6,253,161).**

As to claim 15, Rotzoll an optical pointing system comprising:

a) a plurality of pixels(photo detector array 420) ((Col. 7, lines 32 – 50), each having a photocell (photosensitive element 1000 and integrating circuit 1100) which receives light and generates an analog signal corresponding to a quantity of the received light (Col. 3, line 57 – Col. 4, line 5). Rotzoll shows the pixel in greater detail in

figure 3. The photosensitive element (1000) and the integrating circuit (1100) (support hardware) provide an analog signal ( $V_{out}(t)$ ).

a latch type comparator (comparator circuit 1300 A-D) which compares the analog signal of the photocell ( $V_{out}(t)$ ) and an analog signal of a photocell of an adjacent pixel ( $V_{r1}$  (pixel on the right) or  $V_{u1}$  (pixel on top)) and generates a digital signal having a value of the compared result ( $E_x$ - and  $E_y$ -) (Col. 9, lines 28 – 42). In figure 7, Rotzoll shows the latch type comparator (1300) in greater detail. The timing signal ( $\Phi_2$ ) is used to latch the comparator (Col. 10, lines 46 – 50).

Rotzoll (Fig. 1) teaches the outputs of the comparators go through a NAND gate (1765, 1770, and 1775) and latch (1760 A-C) (Col. 3, lines 45 – 49). Rotzoll also teaches the NAND gates of figure 2 are not illustrated in figure 6A and B. Rotzoll does not specifically teach a switch. Rotzoll teaches the output may be directly supplies to the processing means (Col. 9, lines 49 – 58). The Bock reference is brought in to teach a switch on the output of the comparator. Bock (Fig. 3) teaches a latch type comparator with a switch (306) on the output of the comparator (Col. 3, lines 61 – 64). The comparator is used with additional circuitry to perform analog-to-digital conversion. Replacing the analog-to-digital converter and memory of a conventional digital pixel sensor minimizes many issues associated with conventional digital pixel sensors while preserving the architecture's resistance to noise and speed. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a switch as taught by Bock to the sensing device and optical pointing device of Rotzoll, because the digital pixel sensor (DPS) architecture preserves the

superior noise, low power consumption, and speed characteristics associated with digital pixel systems (Col. 1, line 54 – Col. 2, line 8).

b) Rotzoll teaches an image processor (processing means 400) which calculates a movement value using the digital signals outputted from the plurality of pixels and generates a pixel select signal and a shutter control (Col. 8, lines 13 – 21). Rotzoll teaches the use of a processing means to calculate a movement value. Rotzoll does not specifically teach a pixel select signal or a shutter control. Rather Rotzoll teaches the output of the processing means goes to a host. Arias – Estrada teaches a pixel select signal (sel\_pix) and a shutter control information signal (sum\_p) (Col. 9, line 20 - 34); and

c) a shutter control circuit (external circuitry) for generating a shutter control signal corresponding to the shutter control information signal of the image processor (Col. 9, line 20 - 34)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided pixel select signal (sel\_pix) and a shutter control information signal as taught by Arias – Estrada to the sensing device and optical pointing device of Rotzoll, because it will provide one or more of the following advantages: continuous velocity vector field extraction, high density array of pixels, high density array of motion vectors in real-time, real-time operation, minimize the use of transistors in analog VLSI susceptible to mismatch and process variation. Minimize the number of analog voltages to bias the a VLSI structures reducing routing complexity, compact three-chip solution to the motion computation paradigm: focal plane sensor,



RAM memory, digital interface, potential low-cost fabrication, low power consumption, and robust operation (Col. 2, line 55—Col. 3, line 2)


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher K. Peterson whose telephone number is 571-270-1704. The examiner can normally be reached on Monday - Friday 6:30 - 4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NgocYen Vu can be reached on 571-272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CKP  
14 February 2008

  
Tim Henn  
Patent Examiner, GAV 2622